

Subject List for
Photo Copy

Subjects

Engineering Mathematics - I
Basic Mechanical Engineering
Engineering Mathematics - II
Industrial Chemistry
Basic Electrical Engineering

Que	Que Marks	Obt. Marks
Q.1A)	1	1
Q.1B)	1	.5
Q.1C)	1	.5
Q.1D)	1	N
Q.2A)	6	N
Q.2B)	6	3
Q.3A)	3	N

2

AISSMS INSTITUTE OF INFORMATION TECHNOLOGY (IIIT)
An Autonomous Institute Affiliated to Swami Vivekananda University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with 'A' Grade (NBA - 5 US Programmes)

Question No. 1

(Q1 A) Sand Casting process is done by pouring molten metal in mould (sand) and then such that the object we have to make is made in wooden frame and then pressed in mould to achieve its shape then after pouring molten metal in mould it is led to cool down and then the product is formed.

(Q1 B) Welding is a process where the thing is heated at more than 3000°C to join the materials and its is hardly joined so that it cannot be removed easily. Welding can be done without any other material or we can say welding need some material which we are joining.

(Q1 C) Forging is a process where the object is heated and pressed using hammer, etc. such that it is allowed to expand freely after it is being pressed.
2 types of forging are :-
1) Open die forging
2) Closed die forging.

3

AISSMS INSTITUTE OF INFORMATION TECHNOLOGY (IIIT)
An Autonomous Institute Affiliated to Swami Vivekananda University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with 'A' Grade (NBA - 5 US Programmes)

Question No. 2 :-

(Q2 B) Sheet Metal Working is a process where the sheet can be folded, punched such that it is efficient, it means that when we push or punch, fold, etc to a material, less waste is produced and most of the sheet is used.

For eg:- Tin Can, etc.

Diagram of Blanking & Punching Operation.

Blanking Operation

Punching Operation

4

AISSMS INSTITUTE OF INFORMATION TECHNOLOGY (IIIT)
An Autonomous Institute Affiliated to Swami Vivekananda University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with 'A' Grade (NBA - 5 US Programmes)

Difference between Blanking & Punching Operation :-

Blanking Operation	Punching Operation
1) In this operation the part which has been punched is the useful product.	1) In this operation the part which has been punched is the waste product.
2) The part which remains after being punched is waste / Not useful product.	2) The part which has been remains after being punched is useful product.

Question No. 3 :-

(Q3 B) The three operations of Sheet Metal Forming are :-
1) Blanking Operation
2) Punching Operation
3) Coining Operation

Blanking Operation is the operation in which the usefull product is produced after punching it from the sheet such that after punching it the remaining part is not usefull.
Illustrate with diagram :-

5

AISSMS INSTITUTE OF INFORMATION TECHNOLOGY (IIIT)
An Autonomous Institute Affiliated to Swami Vivekananda University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with 'A' Grade (NBA - 5 US Programmes)

Blanking Operation

Punching Operation

2) Punching Operation :-
In this operation the part which has been punched is waste product & part which remains after being punched is Usefull product.

3) Coining Operation :-
In this operation a thick layer of metal is pressed against the coined surface which contains letter, numbers symbol shapes so that when we press it against coin the pattern is visible on coin.

6

AISSMS INSTITUTE OF INFORMATION TECHNOLOGY (IIIT)
An Autonomous Institute Affiliated to Swami Vivekananda University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with 'A' Grade (NBA - 5 US Programmes)

Coining Process

(Q3C) Closed die manufacturing is a process

7

AISSMS INSTITUTE OF INFORMATION TECHNOLOGY (IIIT)
An Autonomous Institute Affiliated to Swami Vivekananda University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with 'A' Grade (NBA - 5 US Programmes)

Process :-

Step 1 :- Heat an object such that at that specific temperature if it is pressed then object changes shape.

Step 2 :- Keep the object in this tool

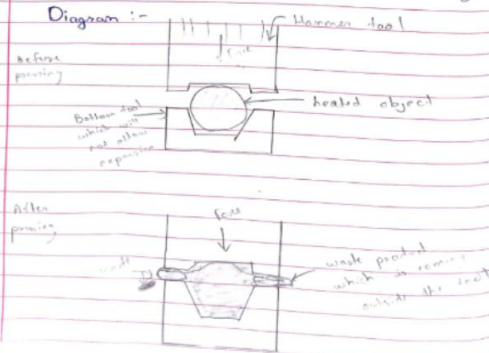
Step 3 :- Press the hammer tool such that waste part comes out a little

Step 4 :- Clean the waste part

Step 5 :- Product is ready just make and

where the metal is heated and then it is pressed using hammer tools, etc such that it is not allowed to expand freely and made in closed die set only

Diagram :-



Question No. 4

- Q4 A) Drilling is a process where the hole is made in the object using drilling machines which have screw tail like structure which can make hole by rotating.
- Q4 C) Industry 4.0 is the industry which relies on robots, automation, etc, AI, for production in mass as it requires less workers but the workers must be skilled to use this high level machines. Industry 4.0 relies more on IOT based to make production in mass and in easy way.

- Q4 D) Internet of Things consist of wifi, bluetooth where the data is processed locally then it is forwarded to the website which then shows the real time output of what is being done in the factory. The data is shown on our apps on mobile phones and laptops.

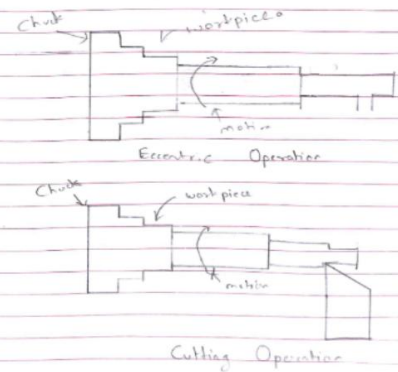
Question No. 6

- Q6 A) Automation is required in the industry for the following reasons :-
- Mass production can be done with the help of automation.
 - Less workers are required for the industry having automation tools.
 - The industry having advanced automation robots can automate the robots such that they can be programmed to do different task for small production rate, etc.
 - Though automation devices have more maintenance rate but it reduces the need for workers handling production rate with minimal errors.

Benefits of Automation are :-

- Mass Production.
- Minimal errors, more accurate.
- Labour cost reduced.
- Can be programmed later to do different tasks.

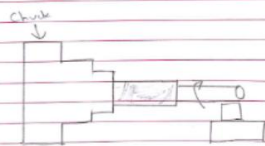
Q6 B) LATHE MACHINE operations.



10



AIITM
INSTITUTE OF INFORMATION TECHNOLOGY (IIIT)
ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Anna University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with 'A' Grade (NBA - 5 UG Programmes)



Turning Operation

Question No. 7

- Q7 A) Boiler is a device which is used in industry to boil water at high temperature such that pressure created inside the boiler is thrown out using a hollow pipe which can be later connected to turbine which can generate electricity.
- Q7 B) Heat Engine is a device which converts fuel into mechanical energy and then it is connected to cooled part such that excessive heat can be thrown out using it.

11



AIITM
INSTITUTE OF INFORMATION TECHNOLOGY (IIIT)
ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Anna University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with 'A' Grade (NBA - 5 UG Programmes)

- Q7 D) Thermodynamic System consist of surrounding which is separated from system through walls of glass, wood, steel, etc
- The 3 types of thermodynamic systems are

- Open System
- Closed System
- Isolated System.

Question No. 8

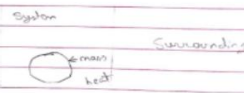
- Q8 B) We know that thermodynamic system consist of surroundings which is separated from system using a barrier.

The 3 types of thermodynamic Systems are :-

- Open System
- Closed System
- Isolated System.

1) Open System :-

In this system is kept open to surrounding such that mass, heat or temperature can be passed to surrounding as it is open system.

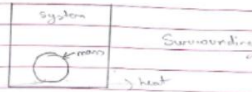


mass, temp can be transferred
to surrounding
Open System

2) Closed System:-

In this system the mass cannot transfer to surrounding but the temperature can be transferred.

Diagram:-



mass cannot be transferred
but temperature can be transferred

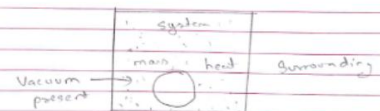
Closed System

3) Isolated System:-

In this system both the mass & temp cannot be transferred to surrounding because vacuum is present inside the



system



No transfer of heat & mass

Isolated System.

(Q10)

(Q10A)

A brake is a tool which helps to reduce the acceleration of vehicle. It also helps during road on hill to keep the acceleration constant & slow.

(Q10B) Automobile

(Q10C)

Steering System in Automobile are used to control the direction of the vehicle so that vehicle can take a turn and go towards the right place.

(Q10D)

The function of fuel system is to supply fuel to the engine where the pistons work that converts fuel to mechanical energy.



Question No. 11

(Q11A) Automobiles are classified as:-

Automobiles

1) Vehicle types:-

- People travelling:- Vehicles like cars, bikes are made so that people can travel with ease.
- Goods travelling:- Vehicles like trucks, trains are made for transport of goods from one place to another for heavy goods.

2) Fuel Types:-

- Petrol:- Petrol vehicles are bikes, cars, etc. petrol engines are cheaper than diesel engines and efficiency is also less than diesel engines.
- Diesel:- Diesel vehicles are cars, trucks, etc. where the diesel engines are more expensive and the efficiency is good than petrol engines.
- Hybrid:- Hybrid vehicles consist of petrol engine + electric motor which can run both on electricity & petrol. Which also uses charging technology.



d) Electricity:- Vehicles which are electric like bikes, cars, etc. which does not emit gases and runs on pure electricity.

3) No. of Strokes in engine

- Two Stroke engine:- It is low efficient and produces more smoke.
- Four Stroke engine:- It is more efficient & produces less smoke than 2 stroke engine.

4) Work Basis

- Transportation:- Where transportation of humans and goods can be done.
- Working On Sites:- TCB, Tractor which are used for working on sites.



Question No. 12

(Q12A) Chassis is most significant component of automobile system because chassis is responsible for holding all the components, weight. It is also known as backbone of automobile. It holds the weight of engine, generator, motor, etc.

Where the chassis



If it was the new & modern chassis system, they are generally made up of much more stronger materials, if the car crashed in the concrete wall the modern chassis system front part would have been folded such that the impact would have been distributed over and the human will have no impact and would walk out of the car without worry.

(Q12C)

The Safety systems are very important in automobiles because whenever a crash happens the human can walk out without scratches. In today's modern safety system consists of airbags, smart

crash is most significant component, it is because the material which it is made up of is responsible to protect the humans sitting in the car in any incidents.

For eg:-

Take a some years car crashed with concrete wall.

If it was old chassis system the impact would have come till human and it would have been impossible for human to survive that crash.

deat systems in car, etc.

Whenever a crash happens the chassis system is so strong to absorb shock and impact, the airbags inflate immediately reducing impact on human, smart alert systems immediately inform to emergency contacts that the crash has happened thereby causing no harm to humans and animals.

The safety systems are essential in our life as new cars which have auto driving mode are trained to avoid accidents, and also they can operate on their own.

18



AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IIIT)

ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with 'B+' Grade (NBA - 5 UD Programmes)

(Q5 B) CNC Machine is used for creating complex structures such that the product is first designed on software then saved in STL file and then moved to 3D software where all the parameters are decided and the depth is decided according to axis how much does the spindle should go inside.

Working of CNC:-

- step 1) The product is designed in CAD and then saved in STL file.
- step 2) The STL file is then moved to 3D software slicing so that the parameters can be decided what to turn on how deep in x-axis the spindle can go etc.
- step 3) The program is given command to start the operation in CNC machine.
- step 4) The object starts to be made & ladder by ladder.
- step 5) After the product is made then we have to cut the support part of it and product is ready.

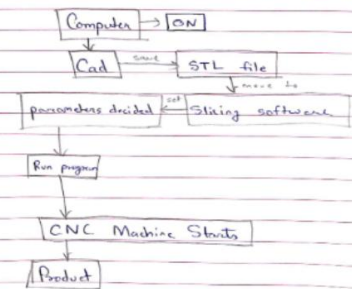
19



AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IIIT)

ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with 'B+' Grade (NBA - 5 UD Programmes)

In CNC Machine it takes time for making a product but complex products can be made through it.



Block Diagram of CNC

20



AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IIIT)

ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with 'B+' Grade (NBA - 5 UD Programmes)

(Q9)

A) Given :-
 $\theta_c = -10^\circ\text{C} = -10 + 273\text{K} = 263\text{K}$
 $\text{COP} = 3$
 $W = 30\text{KW}$

Formula :-

$$\text{COP} = \frac{\theta_H}{W_{\text{in}}}$$

$$W = \frac{T_1 - T_2}{\text{COP}}$$

$$W = 1 - \frac{T_2}{T_1}$$

21



AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IIIT)

ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with 'B+' Grade (NBA - 5 UD Programmes)

B)

$l_1 = 2\text{mm} = 0.2\text{m}$
 $l_2 = 1\text{m}$
 $T_1 = 25^\circ\text{C} = 25 + 273\text{K} = 298\text{K}$
 $P = 100\text{W}$

(C) Convection Coefficient = $500\text{ W/m}^2\text{K}$

(2) Non Convection Coefficient :-

$$\frac{P}{l_1 \times l_2 \times T_1} = \frac{100\text{ W}}{0.2\text{m}^2 \times 298\text{K}} = 1.677 \frac{\text{W}}{\text{m}^2\text{K}}$$

$$\text{Surface Temperature} = \frac{C_1}{C_2}$$

$$= \frac{500}{1.677}\text{K}$$

$$= 298.15\text{K}$$

Formula :-

$$W = T_1 - T_2$$

22



AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IIIT)

ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with 'B+' Grade (NBA - 5 UD Programmes)

23



AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IIIT)

ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with 'B+' Grade (NBA - 5 UD Programmes)

24



Savitribai Phule Pune University



**AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IIIT)**

ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with "A" Grade (NBA - 5 US Programmes)



25



Savitribai Phule Pune University



**AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IIIT)**

ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with "A" Grade (NBA - 5 US Programmes)



26



Savitribai Phule Pune University



**AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IIIT)**

ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with "A" Grade (NBA - 5 US Programmes)



27



Savitribai Phule Pune University



**AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IIIT)**

ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognized by Govt. of Maharashtra
Accredited by NAAC with "A" Grade (NBA - 5 US Programmes)




**AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IIIT)**

ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognized by Council of Maharashtra
Accredited by NAAC with "A" Grade | NBA - 5 UG Programmes


**AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IIIT)**

ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognized by Council of Maharashtra
Accredited by NAAC with "A" Grade | NBA - 5 UG Programmes


**AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IIIT)**

ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognized by Council of Maharashtra
Accredited by NAAC with "A" Grade | NBA - 5 UG Programmes


**AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IIIT)**

ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognized by Council of Maharashtra
Accredited by NAAC with "A" Grade | NBA - 5 UG Programmes


**AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IIIT)**

ADDING VALUE TO ENGINEERING
An Autonomous Institute Affiliated to Savitribai Phule Pune University
Approved by AICTE, New Delhi and Recognized by Council of Maharashtra
Accredited by NAAC with "A" Grade | NBA - 5 UG Programmes

Rough Work

$$n = 1 - \frac{T_2}{T_1}$$

$$W_n = Q_n \times \eta_v$$

$$W = (T_1 - T_2)$$

$$T_1 = 25^\circ\text{C}$$

$$T_1 = 25^\circ\text{C}$$

$$d = 2\text{mm}$$

$$\frac{1100 - 200}{1100}$$

$$\frac{300}{1100}$$

$$= 0.81$$

$$A = 1\text{m}^2$$

$$T_1 = 1100^\circ\text{C}$$

$$T_2 = 200^\circ\text{C}$$

$$W = Q_c - Q_h$$

$$20\text{ kW}$$

Turning Operation

Cutting Operation

$$\text{COP} = \frac{Q_h}{W_{\text{net}}}$$

$$6$$

$$-10 + 27$$

$$3 \times 30\text{ kW} = Q_h$$

$$Q_h = 60\text{ J}$$

$$C(T_1^2 - T_2^2)^2$$

$$500 - T_2 = T_1$$